

## CLAIMS

What is claimed is:

1. A chirped pulse amplifier for a fiber optic system the amplifier comprising:

a mode-locked laser; and

a pulse selector coupled to an output of the mode-locked laser, wherein the pulse selector modulates an output stream of pulses based upon an applied modulation voltage.

2. The chirped pulse amplifier according to claim 1, wherein the pulse selector comprises an electro-optic modulator.

3. The chirped pulse amplifier according to claim 2, wherein the electro-optic modulator is a LiNbO<sub>3</sub> modulator.

4. The chirped pulse amplifier according to claim 1, wherein the pulse selector comprises an electro-absorption modulator.

5. A chirped pulse amplifier for a fiber optic system the amplifier comprising:

a mode-locked laser;

a polarization-maintaining device coupled to an output of the mode-locked laser;

a pulse stretcher coupled to a first output of the polarization-maintaining device;

an amplifier coupled to the pulse stretcher; and

a first pulse selector coupled to a second output of the polarization-maintaining device.

6. The chirped pulse amplifier according to claim 5, wherein the pulse stretcher comprises:

a non-polarization-maintaining dispersion compensating fiber; and

a Faraday rotator mirror.

7. The chirped pulse amplifier according to claim 5, wherein the pulse stretcher comprises:

a non-polarization-maintaining dispersion shifted fiber; and

a Faraday rotator mirror.

8. The chirped pulse amplifier according to claim 5, wherein the pulse stretcher comprises:

a linearly chirped fiber grating; and

a Faraday rotator.

9. The chirped pulse amplifier according to claim 5, wherein the pulse stretcher comprises:

- a non-linearly chirped fiber grating; and
- a Faraday rotator.

10. The chirped pulse amplifier according to claim 5, wherein the amplifier comprises:

- an erbium doped fiber amplifier or a erbium/ytterbium or a ytterbium doped fiber amplifier;
- a wavelength division multiplexer; and
- a diode pump.

11. The chirped pulse amplifier according to claim 5, wherein the first pulse selector comprises an electro-optic modulator or an electro-absorption modulator.

12. The chirped pulse amplifier according to claim 5, wherein the polarization-maintaining device comprises a polarization-maintaining beam router, wherein a fiber axis orientation of the input and output fibers matches the orientation of the polarization beam splitter.

13. The chirped pulse amplifier according to claim 5, wherein the polarization-maintaining device comprises:

a polarization-maintaining beam router, wherein a fiber axis orientation of the input and output fibers matches the orientation of the polarization beam splitter.

a Faraday rotator disposed at a first port of the polarization-maintaining beam router; and

a Faraday rotator mirror at that port of the polarization-maintaining beam router in case the optical device is transmissive.

14. The chirped pulse amplifier according to claim 5, further comprising:

a second pulse selector coupled to an output of the first pulse selector; and

a synchronization controller that synchronizes the first pulse selector with the second pulse selector.

15. The chirped pulse amplifier according to claim 14, wherein the second pulse selector comprises an electro-optic modulator or an electro-absorption modulator.

16. A chirped pulse amplifier for a fiber optic system operating at approximately 1550 nanometers or other wavelength, the amplifier comprising:

a mode-locked laser;

a polarization-maintaining device coupled to an output of the mode-locked laser;

a pulse stretcher coupled to a first output of the polarization-maintaining device;

a first amplifier coupled to the pulse stretcher;

a pulse selector coupled to the first amplifier; and

a second amplifier coupled through a beam splitter to a second output of the polarization-maintaining device.

17. The chirped pulse amplifier according to claim 16, wherein the pulse stretcher comprises:

a polarization-maintaining dispersion compensating fiber; and

a Faraday rotator mirror, wherein the pulse selector is coupled between the first amplifier and the Faraday rotator mirror.

18. The chirped pulse amplifier according to claim 16, wherein the pulse stretcher comprises:

a polarization-maintaining dispersion shifted fiber; and

a Faraday rotator mirror, wherein the pulse selector is coupled between the first amplifier and the Faraday rotator mirror.

19. The chirped pulse amplifier according to claim 16, wherein the pulse stretcher comprises:

a linearly chirped polarization-maintaining fiber grating; and

a Faraday rotator, wherein the pulse selector is coupled between the first

amplifier and the Faraday rotator.

20. The chirped pulse amplifier according to claim 16, wherein the pulse stretcher comprises:

a non-linearly chirped polarization-maintaining fiber grating; and

a Faraday rotator, wherein the pulse selector is coupled between the first amplifier and the Faraday rotator.

21. The chirped pulse amplifier according to claim 16, wherein the first amplifier comprises:

an erbium doped fiber amplifier or a erbium/ytterbium doped fiber amplifier or a ytterbium doped fiber amplifier;

a wavelength division multiplexer; and

a diode pump.

22. The chirped pulse amplifier according to claim 16, wherein the pulse selector comprises an electro-optic modulator or an electro-absorption modulator.

23. The chirped pulse amplifier according to claim 16, wherein the polarization-maintaining device comprises a polarization-maintaining beam router, wherein a fiber axis orientation of the input and output fibers matches the orientation of the polarization beam splitter.

24. The chirped pulse amplifier according to claim 16, wherein the polarization-maintaining device comprises:

a polarization-maintaining beam router, wherein a fiber axis orientation of the input and output fibers matches the orientation of the polarization beam splitter.

a Faraday rotator disposed at a first port of the polarization-maintaining beam router; and

a Faraday rotator mirror at that port of the polarization-maintaining beam router in case the optical device is transmissive.

25. The chirped pulse amplifier according to claim 16, wherein the second amplifier comprises double clad multimode amplifier fiber operating as a single mode amplifier.

26. The chirped pulse amplifier according to claim 16, wherein the second amplifier comprises double clad multimode amplifier fiber operating as a single mode amplifier, wherein the double clad multimode amplifier fiber core is less than or equal to 20 micrometers in diameter.

27. A chirped pulse amplifier for a fiber optic system the amplifier comprising:

a mode-locked laser;

a polarization-maintaining device coupled to an output of the mode-

locked laser;

a pulse stretcher coupled to a first output of the polarization-maintaining device;

a first pulse selector coupled to a second output of the polarization-maintaining device;

a second amplifier coupled through a beam router to an output of the first pulse selector; and

a second pulse selector coupled to the second amplifier.

28. The chirped pulse amplifier according to claim 27, wherein the pulse stretcher comprises:

a linearly chirped fiber grating; and

a Faraday rotator.

29. The chirped pulse amplifier according to claim 27, wherein the pulse stretcher comprises:

a non-linearly chirped fiber grating; and

a Faraday rotator.

30. The chirped pulse amplifier according to claim 27, wherein the first pulse selector comprises an electro-optic modulator or an electro-absorption modulator.



31. The chirped pulse amplifier according to claim 27, wherein the polarization-maintaining device comprises a polarization-maintaining beam router, wherein a fiber axis orientation of the input and output fibers matches the orientation of the polarization beam splitter.

32. The chirped pulse amplifier according to claim 27, wherein the polarization-maintaining device comprises:

- a polarization-maintaining beam router, wherein a fiber axis orientation of the input and output fibers matches the orientation of the polarization beam splitter.

- a Faraday rotator disposed at a first port of the polarization-maintaining beam router; and

- a Faraday rotator mirror at that port of the polarization-maintaining beam router in case the optical device is transmissive.

33. The chirped pulse amplifier according to claim 27, wherein the second amplifier comprises double clad multimode amplifier fiber operating as a single mode amplifier.

34. The chirped pulse amplifier according to claim 27, wherein the second amplifier comprises double clad multimode amplifier fiber operating as a single mode amplifier, wherein the double clad multimode amplifier fiber core is less than or equal to 20 micrometers in diameter.